Posterior Approach for Total Ankle Replacement

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Statement of Purpose

Total ankle arthroplasty (TAA) is a procedure with high utility in patients that desire to maintain motion to their ankle joint. It typically occurs through either an anterior or a lateral approach. Historically, a poor anterior soft tissue envelope has been a contraindication for TAA (Van der Plaat and Easley). With a posterior approach, one can avoid the pitfalls associated with an anterior incision in presence of a poor soft tissue envelope. The posterior approach to the ankle was first described by Hanson et al in FAI 2002 and has been shown to have safe and reproducible outcomes with a low complication rate while still providing exposure to the ankle joint (Hammitt). The posterior midline approach for total ankle arthroplasty is limited in current literature and has only been reported twice, both with satisfactory results (Devries and Bibbo). The purpose of this study was to provide further insight to the role of a posterior approach to TAA.

Case Study

We present the case of a 43 year old male with past medical history significant for well-controlled thyroid disease, hypertension and anxiety who was involved in MVC. Orthopedic injuries included an open left talus fracture-dislocation with calcaneal fracture treated definitively with external fixation. Extensive soft tissue distruption to the anterolateral aspect of the foot & ankle at time of injury resulted in the need for a radial forearm free flap for soft tissue coverage (Figure 1). He was neurovascularly intact with tenderness to palpation about the left foot and ankle and intact motor and light touch sensation distally at the digits.

Figure 1: Radial forearm free flap to the dorsolateral foot due to extensive soft tissue disruption

After healing the soft tissue, the patient presented with continued left ankle pain and inability to bear weight to the left lower extremity. XR images of the left ankle were obtained and due to the previous open injury, Avascular Necrosis versus osteomyelitis were suspected (Figure 2).

Figure 2: Lateral XR projection revealing lucency and sclerotic changes to the talar dome.

The patient was then brought to the operating room where bone biopsy was obtained of the calcaneus, tibia and talus for future surgical planning. Chronic osteomyelitis of the left talus was revealed without isolation of organism on microbiology examination. Decision was made at this time to treat the patient empirically with antibiotic impregnated cement spacer at the tibotalar space with resection of suspected non-viable bone (Figure 3).

Case Study

Figure 3: Immediate post-operative XR films of the anterior and lateral ankle revealing interval placement of antibiotic delivery device.

After a time period of 3 months, the patient returned to the operating room for removal of the antibiotic spacer and frozen section to evaluate for residual bone infection. Cultures at this time were negative. Due to concerns of anterior ankle soft tissue quality due to previous free flap and multiple skin grafting, a conventional anterior ankle approach was contraindicated (Figure 4).

Figure 4: Clinical AP view of the patients left and right ankle revealing radial free flap and soft tissue indentation at the level of the ankle joint.

With the patient in prone positioning a posterior approach was utilized. The Achilles tendon was encountered upon initial dissection which was incised longitudinally in Z-fashion. The free ends of the tendon were hydrated with saline impregnated gauze for the remainder of the procedure to prevent desiccation. With assistance of intraoperative fluoroscopy, the appropriate anatomical axis was obtained and resection guides were calibrated from the posterior aspect of the ankle joint (Figure 5). The resection of the tibia and talus was coupled to create two opposing flat surfaces.. This was followed by the insertion of a size 4 tibial and talar tray with 8mm polyethylene component.

Figure 5: Intraoperative photo of manual instrumentation of TAA through posterior approach, patient calf on left and heel at right.

Case Study Continued

The ankle was deemed free of restricted range of motion. The Achilles tendon was repaired and lengthened in Z-fashion to allow adequate motion at the ankle joint. The posterior skin was then repaired in standard fashion. Post-operatively, the patient remained non-weight bearing in CAM walker boot for 4 weeks. The posterior incision healed at 3 weeks post-operatively followed by initiation of active ROM exercises. He then transitioned to WBAT in CAM walker boot at 4 weeks. He was able to WBAT as tolerated in normal shoe gear at 6 weeks with assistance of an ASO. Ultimately, he has returned to unrestricted WBAT in normal shoe gear without the need of assistive devices.

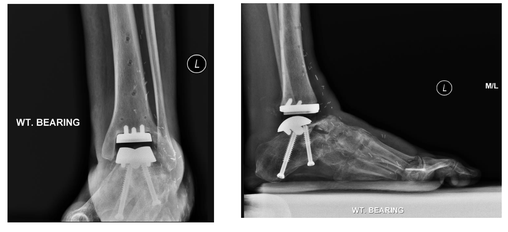

Figure 4: Postoperative weight bearing x-ray films obtained of the left ankle revealing interval placement of ankle implant without signs of hardware failure or loosening

Figure 5: One year post-operative appearance of the posterior and lateral aspect of the patients left foot/ankle

The clinical appearance of the patients hindfoot and left lateral ankle at final follow-up parallel what is expected through standard TAA. He has restored anatomical alignment without complication throughout the post-operative period. AOFAS hindfoot and LEFS scores obtained throughout the operative period at set intervals demonstrated an improvement that is seen in conventional TAA (Table 1).

Functional Outcome Scores				
	Pre-op	12 Weeks	6 Months	1 Year
AOFAS Hindfoot	9	46	74	81
LEFS	17.50%	61.25%	75%	77.50%

Table 1: Functional AOFAS (American Orthopedic Foot and Ankle Society) and LEFS (Lower Extremity Functional Scores) at each prominent follow-up interval.

Analysis & Discussion

Radiographic imagining revealed placement of the prosthesis with interval bone resection. Due to the variation in insertion technique the placement of the implant was in reverse to manufacturers protocol (Figure 4). Clinically, the patient has a near anatomic restoration of the left lower extremity and is extremely satisfied with the result. Due to TAA and innovations within the field, the patient returned to his normal daily lifestyle.

Our case demonstrates that a posterior approach to a total ankle arthroplasty is safe and can achieve promising results. The AOFAS score at final follow up was 81, showing a total improvement of 72 in comparison to pre-operative values. This compares favorably to a recent systematic review and meta-analysis showing that the average AOFAS improvement with TAA was 43.6 (Onngo). The LEFS score improved from 17.5% to 77.5% for a 60% functional improvement (Table 1).

This case study reveals the utility and viability of the posterior approach in total ankle when the skin on the anterior ankle is compromised. Furthermore, we found that the results achieved through use of this approach are comparable to those that have been treated with the standard anterior approach.

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